REMARKS

Claims 1, 3, 4-6, 8-10, 12, 14, 17-19, and 21-25 remain in this application. Claims 2, 13, 15, 16, 20, and 26 have been cancelled. Claims 1, 6, 10, 14, 17, 21, 22, and 23 have been amended.

Applicants thank the Examiner for the detailed study of the application and prior art. At the outset, Applicants have reviewed the prior art references, notably U.S. Patent No. 6,590,698 to Ohtsuki et al. (hereinafter "Ohtsuki") and U.S. Patent No. 5,978,531 to Funabashi, both used in combination with each other to reject the claims as obvious.

Applicants note that the present invention is more than an optical signal processing system using a conventional optical splitter with branching waveguides that split an optical signal (Ohtsuki) or doped fibers that allow some amplification or enhanced signal propagation (Funabashi).

The present invention overcomes the disadvantages of the prior art as shown in FIGS. 1-3 and the lossless splitter of FIG. 4. The present invention overcomes inherent loss of prior art power splitters by implementing a gain element into a stepped splitter circuit and distributing gain throughout the optical splitter circuit. The present claims have been amended to stress that the gain occurs by pumping an optical pump signal through the stepped, optical splitter circuit in the same direction as the optical signal entering the input

optical fiber, exciting the laser ions that are doped in the stepped optical splitter circuit, and distributing gain throughout the optical splitter circuit.

Because amplification occurs in the stepped and branch optical splitter circuit, the optical pump signal must pump an optical pump signal through this stepped, optical splitter circuit in the same direction as the optical signal because the pump signal must also split and excite laser ions throughout the stepped and branched configuration.

Applicants note, and the Examiner has also noted, that the two prior art references Ohtsuki and Funabashi are silent as to direction of pumping because both Ohtsuki and Funabashi relate only to conventional prior art optical amplifiers or doped waveguides that can be pumped in either direction.

Indeed, the base reference Ohtsuki is specifically directed to a prior art splitter circuit discussed in the background and detailed description of the instant application as prior art. In Ohtsuki, an input signal is split into a number of output signals by a splitter 14,16. A plurality of fiber optical amplifiers are positioned on the output of the splitting device on each output fiber. Of course, these amplifiers positioned at the output of each optical fiber could be erbium doped fiber optical amplifiers or ytterbium doped fiber optical amplifiers 18,19.

Ohtsuki nowhere discloses or suggests the use of a stepped, optical splitter circuit formed from a plurality of laser ion doped optical waveguides or fibers branching stepwise. Ohtsuki also nowhere discloses or suggests an optical pump source for pumping an optical pump signal through the splitter circuit in the same direction as the optical signal entering the input optical fiber and exciting the laser ions in the stepped, optical splitter circuit. Indeed, Ohtsuki is silent on the direction of the optical signal because any optical signal pumping could be in either direction because the optical amplification in Ohtsuki does not occur in any stepped or optical splitter circuit.

Ohtsuki is clear as set forth starting in column 5, starting at line 15 and continuing onto line 26 as follows:

> "Next, as the plurality of fibers disposed on the output sides of the light dividing or branching device, a plurality of fiber optical amplifiers are preferable. Further, it is preferable that the light beams are amplified by the fiber optical amplifiers (for example, erbium doped fiber optical amplifiers or ytterbium doped fiber optical amplifiers 18, 19 in an embodiment and the like) and the plurality of fiber optical amplifiers are bundled. With this arrangement, laser light having higher intensity can be obtained. Further, if necessary, non-doped fibers may be coupled to the output ends (for example, fiber output ends 114, 29 in an embodiment and the like) of the plurality of fiber optical amplifiers."

Ohtsuki may change the prior art optical amplifiers slightly in order to suppress fluctuation in ultraviolet light outputs resulting from fluctuation amplification gain of the fiber optical amplifiers. Ohtsuki would use a fiber output control device for monitoring output lights from the fibers and controlling the pumping power of the fiber optical amplifiers. It is thus possible to equalize the ultraviolet light outputs to a specific wavelength.

As to Funabashi, that reference is directed to an optical filter or isolator that integrally conforms the function of an optical fiber with devices made from silicon dioxide (SiO_2) waveguides. Although a doped erbium waveguide is used, Funabashi is directed to conforming functions of the fiber with silicon dioxide (SiO_2) waveguides and miniaturized optical devices, using a V-groove orientated in the crystallized direction of an exposed silicon substrate. It uses a double branched configuration to form a directional coupler. The use of the erbium doped fiber aids in directional coupling and conforms the optical fiber with SiO_2 waveguide types.

There is no disclosure or suggestion in Funabashi of an optical splitter circuit and laser ion doped optical waveguides or fibers branching stepwise, and an optical pump source that pumps an optical pump signal through the stepped,

optical splitter circuit in the same direction as the optical signal entering the input optical fiber and exciting the laser ions in the stepped, optical splitter circuit and distributing gain through the optical splitter circuit. Indeed, Funabashi is silent on pumping direction because it is directed to a simple circulator, and not a stepped splitter as in the present claimed invention.

Applicants contend that the present case is in condition for allowance and respectfully requests that the Examiner issue a Notice of Allowance and Issue Fee Due. If the Examiner has any questions or suggestions for placing this case in condition for allowance, the undersigned attorney would appreciate a telephone call.

Respectfully submitted,

RICHARD K. WARTHER
Reg. No. 32,180
Allen, Dyer, Doppelt, Milbrath
& Gilchrist, P.A.
255 S. Orange Avenue, Suite 1401
Post Office Box 3791
Orlando, Florida 32802
Phone: 407-841-2330

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Julie Lalan